

Appl. No. 10/091,035  
Amtd. dated March 29, 2004  
Reply to Office Action of December 29, 2003

REMARKS

Reconsideration and allowance of the above-identified application are respectfully requested. Upon entry of this Amendment, claims 1-51 will be pending.

In the Office Action, the Examiner makes minor objections to claims 1-6, 8, 9 and 26 for containing “adapted to” language, and contends that in accordance with the *In re Hutchinson* case, the “adapted to” language does not act as a positive limitation for the claims. Applicants respectfully submit that other precedent holds that the clause “adapted to” does further limit the language of a claim. (See *In re Venezia*, 530 F.2d 956, 958-59, 189 USPQ 149, 151-52 (CCPA 1976) and *Pac-Tec Inc. v. Amerace Corp.*, 903 F.2d 796, 801, 14 USPQ2d 1871, 1876 (Fed Cir. 1990)). Nevertheless, in the interest of advancing prosecution, claims 1-6, 8, 9 and 26, as well as claims 23-25 and 31 which also include the “adapted to” language but were not objected to, are being amended to remove that clause as indicated above. Applicants respectfully note that in no way are these amendments intended to further narrow the scope of the claims, but rather, are being made merely for editorial purposes per the Examiner’s request.

Claims 6, 17 and 28 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite, because they make reference to “802.11” which is an IEEE standard that the Examiner contends is subject to change. Applicants respectfully submit, however, that the term “802.11” used in this context is a term of art, and one skilled in the art would understand that the terms “802.11 network” or “802.11 nodes” do not require that the network or nodes comply with all requirements of the 802.11 standard, but rather, are merely suitable for use in an 802.11-type

Appl. No. 10/091,035  
Amtd. dated March 29, 2004  
Reply to Office Action of December 29, 2003

environment. These claims are being amended as indicated above for clarification, and the Examiner is respectfully requested to withdraw this rejection.

Turning now to the more substantive rejections, claims 1-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,175,745 to Bringby et al. in view of U.S. Patent No. 5,491,837 to Haartsen. Specifically, the Examiner contends that both the Bringby and Haartsen patents disclose or render obvious a system, method and computer readable medium of instructions for evaluating at least one communication link between transmitting and receiving nodes in a communications network to assign a link quality value to the communication link as recited in the rejected claims.

As discussed in detail below, Applicants respectfully submit that all claims should be allowable. Specifically, Applicants respectfully submit that neither the Bringby patent nor the Haartsen patent teaches or suggests a system, method or computer readable medium of instructions that assigns a *link quality value* to a communication link between transmitting and receiving nodes based on the specific criteria recited in independent claims 1, 12 and 23. Namely, neither patent teach or suggests assigning a link quality value based on a transmit power level value *at which the data packet was transmitted by the transmitting node*, as well as a received sensitivity value of the receiving node that receives the data packet, and a received signal strength indication value provided by the network. The patents also fail to teach or suggest that the network includes an ad-hoc wireless communications network, and the link is between transmitting and receiving nodes that are each a wireless node in the ad-hoc wireless communications network. Rather, the Bringby

Appl. No. 10/091,035  
Amdt. dated March 29, 2004  
Reply to Office Action of December 29, 2003

and Haartsen patents disclose techniques for determining transmit power for signals transmitted between a base station and mobile stations in a conventional mobile cellular system using frequency division multiple access (FDMA), time division multiple access (TDMA) or code division multiple access (CDMA) transmitting schemes.

The claimed embodiments of the present invention will now be discussed with regard to the cited references.

The present invention provides a system, method and computer readable medium of instructions for evaluating at least one communication link between nodes in a communication network. In particular, these nodes are fixed or mobile wireless nodes operating in an-hoc communications network. As described beginning, for example, at paragraph 0023 on page 6 of the present application, each node in the network periodically broadcasts routing advertisements to other nodes within its broadcast range. A broadcast routing advertisement includes information in its header pertaining to the transmit power level (TPL) at which the routing advertisement was transmitted. Furthermore, a receiving node can obtain the per-packet receive signal strength indication (RSSI) from the 802.11 physical layer implementation of the network. Also, each node is aware of its receive sensitivity (RS) value which, as described in paragraph 0023, is the "lowest level signal strength at which a received signal containing a data packet can be received in order for the node to be able to successfully recover data from the received data packet." That is, when a node receives a data packet having a received signal value less than the threshold RS value, that node will treat the received signal as noise.

Appl. No. 10/091,035  
Amdt. dated March 29, 2004  
Reply to Office Action of December 29, 2003

A link quality ratio (LQR) of the link between nodes can thus be determined based on an equation as set forth in paragraph 0023, which takes into account the transmit power level (TPL), receive signal strength indication (RSSI), *and* the receive sensitivity (RS) of the receiving node. Accordingly, as described in paragraph 0029, an assessment of the LQR from available links is done with the delivery of each packet. Therefore, when nodes are being used as intermediate nodes through which packets are routed from a source node to a destination node, the nodes whose links have the best LQR can be chosen as the preferred nodes through which to route the data packets.

As discussed above, independent claim 1 defines a system for evaluating at least one communication link between transmitting and receiving nodes in a communication network. The claimed system comprises a processor that is adapted to assign a link quality value to the communication link based on the TPL value at which the data packet was transmitted by the transmitting node, an RS value of the receiving node, and an RSSI value provided by the network. Independent claim 12 defines a method for assigning a link quality value based on these criteria, and independent claim 23 defines a computer readable medium of instructions for determining the link quality value based on these criteria. The dependent claims define further details of the system, method and computer readable medium of instructions as discussed below.

As stated in the Office Action, the Examiner contends that the Bringby patent teaches a system and method for determining a link quality value in the manner recited in the independent claims. Specifically, the Examiner contends that the power level setting technique described

Appl. No. 10/091,035  
Amdt. dated March 29, 2004  
Reply to Office Action of December 29, 2003

beginning at line 12 of column 3 of the Bringby patent, as well as the flow chart shown in Figure 6 and the related description set forth beginning at column 6, line 10 and column 7, line 14 of the Bringby patent disclose the features recited in independent claims 1, 12 and 23. As discussed briefly above, Applicants respectfully disagree.

To begin, Applicants respectfully note that nowhere does the Bringby patent teach or suggest that the base station 100 and mobile stations 1, 2 and 3 transmit *data packets* between each other. Rather, column 1, lines 10-60 describe the radio communications systems as being an FDMA, TDMA or CDMA system. Granted, these systems may employ frames or time slots in which information is transmitted. However, the Bringby patent does not in any way specify that data is transmitted in packet format, which is indicative of an ad-hoc peer-to-peer network. Also, although the Bringby patent may discuss a technique for determining the transmission power level based on uplink and downlink path loss (see, for example, column 5, line 18 through column 6, line 9), the Bringby patent does not determine a *link quality value* of a communication link between, for example, the base station and a mobile station, *based on a transmit power level*. Certainly, because the Bringby patent does not disclose the use of data packets, the Bringby patent cannot teach or suggest that one of the criteria affecting the link quality value is a transmit power level value *at which the data packet was transmitted*.

The Examiner further contends that the "path loss estimate" corresponds to the link quality value. However, Applicants again respectfully note that the link quality value is expressly defined in independent claims 1, 12 and 23 as being based on three criteria: transmit

Appl. No. 10/091,035  
Amdt. dated March 29, 2004  
Reply to Office Action of December 29, 2003

power level, a received sensitivity value and a received signal strength indication value. Granted, column 5, line 23 through column 6, line 9 of the Bringby patent may generally discuss the use of the received signal strength to estimate downlink and uplink path loss. However, nowhere does this passage or any other passage of the Bringby et al. patent disclose that an RS value as described above is taken into account along with the transmit power level value for a *data packet* when determining uplink or downlink path loss. Therefore, Applicants respectfully submit that it is not reasonable to interpret the path loss estimate as corresponding to the link quality value as recited in the claims of the present application.

In addition, Applicants submit that in the system taught by Bringby et al. in which the base station 100 is performing the operations for calculating the path link loss, transmit power, and so on. However, as described beginning in paragraph 0026 of the present application, in the claimed system, method and computer-readable medium of instructions, each node is capable of determining a respective link quality value based on the broadcast routing advertisement it receives. Accordingly, new claims 34-51 are being added as indicated above to specify that a node, in particular, a receiving node, performs the operations for assigning the link quality value to the link between itself and the transmitting node. It is noted that claims 36 and 37, 42 and 43, and 48 and 49 depend either directly or indirectly from claims 5, 16 and 27, respectively, which define the transmitting and receiving nodes as being nodes in an ad-hoc network. Also, claims 38 and 39, 44 and 45, and 50 and 51 depend either directly or indirectly from claims 6, 17 and

Appl. No. 10/091,035  
Amdt. dated March 29, 2004  
Reply to Office Action of December 29, 2003

28, respectively, which define the transmitting and receiving nodes as being nodes in an 802.11 network.

For these reasons, Applicants respectfully submit that one skilled in art would not have found the system, method and computer readable medium of instructions set forth in the independent claims, or in the newly added dependent claims, obvious in view of the Bringby et al. patent.

Turning now to the Haartsen patent, Applicants respectfully submit that like the Bringby et al. patent, the Haartsen patent fails to teach or suggest the transmission of data in data packet format as is inherent in ad-hoc peer-to-peer communication networks. Rather, the Haartsen patent teaches a cellular TDMA, CDMA, or FDMA communication system. Also, like the Bringby patent, the Haartsen patent fails to teach or suggest anything that reasonably can be construed as a link quality value that is calculated based on the transmit power level value *at which the data packet was transmitted*, as well as a received sensitivity value of the receiving node and a received signal strength value provided by the network. Granted, as indicated by the Examiner, the Haartsen patent describes the use of an RSSI measurement to calculate path losses between base stations at the beginning of column 5, line 7. However, as discussed above with regard to the Bringby patent, it is not reasonable to construe path loss as the claimed "link quality value" because the path loss is not calculated based on the three criteria recited in each of the independent claims. Moreover, as with the Bringby et al. patent, the Haartsen patent describes

Appl. No. 10/091,035  
Amdt. dated March 29, 2004  
Reply to Office Action of December 29, 2003

that use of path loss information and an RSSI measurement to determine the transmit power at which its signal should be transmitted, for example, from a base station to a mobile terminal.

In addition, as in the system taught by the Bringby et al. patent, the Haartsen patent teaches that the base stations perform the operations for calculating the path link loss, transmit power, and so on. However, as discussed above, in the claimed system, method and computer-readable medium of instructions, each node is capable of determining a respective link quality value based on the broadcast routing advertisement it receives. This feature is recited more specifically in new claims 34-51.

For all these reasons, Applicants respectfully submit that one skilled in the art would not have found the embodiments of the present invention recited in independent claims 1, 12 and 23, on in the newly added dependent claims, obvious in view of the Haartsen patent.

In addition, Applicants respectfully submit that the dependent claims also recite features that are not recited in or rendered obvious by the Bringby and Haartsen patents. For example, dependent claim 2 defines the system as comprising a packet analyzer that examines a content of the data packet sent between the two nodes to determine the transmit power level. Dependent claims 13 and 24 define a method step and set of instructions, respectively, for performing this operation. Nowhere does the Bringby patent or the Haartsen patent teach or suggest that the signals are transmitted in data packet format, and certainly these patents do not teach or suggest that the content of any such data packet is examined to determine the transmit power level. Dependent claims 3, 14 and 25 specifically recite that the RSSI value is determined from a

Appl. No. 10/091,035  
Amtd. dated March 29, 2004  
Reply to Office Action of December 29, 2003

physical layer of the communications network, which is also not taught or suggested by the Bringby and Haartsen patents. In addition, since the Bringby and Haartsen patents do not teach or suggest the link quality value for the reasons discussed above, these patents cannot teach, suggest or render obvious the use of this link quality value to determine whether additional data packets should be sent on a particular communication link as recited in dependent claims 4, 15 and 26.

As discussed briefly above, nowhere does the Bringby patent or Haartsen patent teach or suggest that the network include an ad-hoc wireless communications network, and that the nodes are wireless nodes in the ad-hoc wireless communications network, as is recited dependent claims 5, 16 and 27. The Bringby and Haartsen patents also fail to teach, suggest or render obvious the specific employment of an 802.11-type network as recited in claims 6, 17 and 28, and certainly do not teach, suggest or render obvious the specific equation for calculating the link quality ratio as expressly recited in claims 7, 18 and 29. Furthermore, because the Bringby and Haartsen patents do not teach or suggest the determination of a link quality value for the reasons discussed above, these patents also do not and can not teach, suggest or render obvious the assignation of a respective link quality value to each of the communication links between transmitting and receiving nodes as recited in claims 8, 19 and 30, as well as the route selection based on the link quality value recited in claims 9, 20 and 31. The patents certainly do not teach or suggest that the route selection is based on the highest link quality value as is recited in claims 10, 21 and 32, because they do not even teach or suggest the calculation of any link quality value in the manner recited in the

Appl. No. 10/091,035  
Amdt. dated March 29, 2004  
Reply to Office Action of December 29, 2003

independent claims of the present application. Finally, because the Bringby and Haartsen patents fail to teach or suggest the transmission of a signal in data packet format, these patents therefore must fail to teach, suggest or render obvious the technique of assigning a link quality value on a per packet basis as expressly recited in claims 11, 22 and 33.

For all these reasons, all claims should be allowable.

Appl. No. 10/091,035  
Amtd. dated March 29, 2004  
Reply to Office Action of December 29, 2003

In view of the above, it is believed that the subject application is in condition for allowance, and notice to that effect is respectfully requested. However, should the Examiner have any questions, the Examiner is invited to contact the undersigned at the number indicated below.

Respectfully submitted,



Joseph J. Buczynski  
Attorney for Applicant  
Reg. No. 35,084

Gardner Carton & Douglas LLP  
1301 K. Street, NW, Suite 900  
Washington, DC 20005  
Phone: (202) 230-5114  
Facsimile: (202) 230-5314

Dated: March 29, 2004

DC01/ 420363.1